



## Natural Heritage & Endangered Species Program

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### Natural Community Fact Sheet **Barrier Beaches**

Barrier beaches are dynamic and changeable systems with an extremely harsh physical environment. Winds constantly shift the shape and pattern of the sand. Sun and rains beat down on an open and exposed ground. Salt spray and windborne sand have a tremendously desiccating effect on the resident flora.

The beach itself is built up by longshore sediment transport from upcurrent beaches. The sloping foreshore areas face the sea, and the backshore runs

from the berm crest to the backing dunes. The berm is an unstable sand ridge that is deposited above mean high water (MHW) by storm wave action. It moderates change on the ocean beach by providing a reservoir of sand available to replenish either beach or dune. The ocean may completely reclaim berm sands in winter for during storms. Dunes are eroded at these times to replenish the lost sand.



Dunes on barrier beach at Wasque on Martha's Vineyard. P. Swain photo.

The dunes behind the beachfront may occur as a single ridge or a series of parallel ridges that extend back through shrub and forest thickets to salt marsh and tidal flats associated with the protected bay or estuarine system. Dune height and the direction of sand movement are determined by the intensity of winds which move sand up the beach. The dunes directly behind the beach berm are the area most severely stressed by wind and airborne salt. These shifting dunes are stabilized by colonies of beachgrass, (*Ammophila breviligulata*). Beachgrass, the dominant vegetation of the shifting dunes, grows rapidly and spreads by forming runners rather than by seeding. Few other plants in the beach/dune community reach out into the unprotected foredunes. Beach heather and dusty miller intermingle with Beachgrass; other plants develop in the more protected dune slack and back dune areas.

#### Typical plant species

##### BEACH/DUNE

*Ammophila breviligulata* (beachgrass)  
*Artemisia stelleriana* (dusty miller)  
*Hudsonia tomentosa* (beach heather)  
*Lathyrus japonicus* (beach pea)  
*Myrica pensylvanica* (bayberry)  
*Solidago sempervirens* (seaside goldenrod)  
*Prunus maritima* (beach plum)  
*Rhus radicans* (poison ivy)

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### SHRUB THICKET/FOREST

*Amelanchier* (shadbush)  
*Aronia melanocarpa* (chokeberry)  
*Arctostaphylos uva-ursi* (bearberry)  
*Corema conradii* (broom crowberry)  
*Deschampsia flexuosa* (hairgrass)  
*Carex* (sedges)  
*Prunus serotina*, *P. virginiana* (, black cherry, chokecherry)  
*Rosa rugosa* (beach rose)  
*Smilax* (briars)  
*Quercus ilicifolia* (scrub oak)  
*Pinus rigida* (pitch pine)  
*Juniperus virginiana* (red cedar)

### Typical Animal Species

*Cancer irroratus* (rock crab)  
*Carcinides maenas* (green crab)  
*Limulus polyphemus* (horseshoe crab)  
*Mercenaria mercenaria* (quahog)  
*Mya arenaria* (softshell clam)  
*Ensis directus* (razor clam)  
*Littorina spp.* (periwinkles)  
*Polinices duplicatus* (moon snail)  
*Thais lapillus* (dog whelk)  
*Crepidula fornicata* (slipper shell)  
*Strongylocentrotus droehbachensis* (sea urchin)  
*Asterias vulgaris* (starfish)  
*Blarina brevicauda* (short-tailed shrew)  
*Tamias striatus* (eastern chipmunk)  
*Marmota monax* (common woodchuck)  
*Vulpus fulva* (red fox)  
*Procyon lotor* (raccoon)  
*Larus argentatus* (herring gull)  
*Sterna hirundo* (common tern)  
*Crocethia alba* (sanderling)

Barrier beaches have a key function in the dynamic coastal environment. They act as buffers to disperse wave energy and minimize storm damage in coastal wetlands and on the mainland. They provide nesting sites for many local shorebirds and stopover sites for migratory species. They are a distinctive land-form with great aesthetic and recreational potential. This recreational use – often intensive – poses perhaps the most severe threat to the barrier beach system. The plant species of the dune and beachfront are uniquely adapted to the continuous natural stresses of the ocean front. However, the barrier beach and dune system are physiographically fragile and are not tolerant of human stresses. The beachfront is fairly hardy and resistant to human-induced ecological damage. This is not true of the sand dune complex. Beachgrass is highly vulnerable to mechanical damage from foot or ORV traffic. Only a few passes by a vehicle can leave permanent tracks and will de-vegetate the trampled area. Where stabilizing beachgrass is absent,

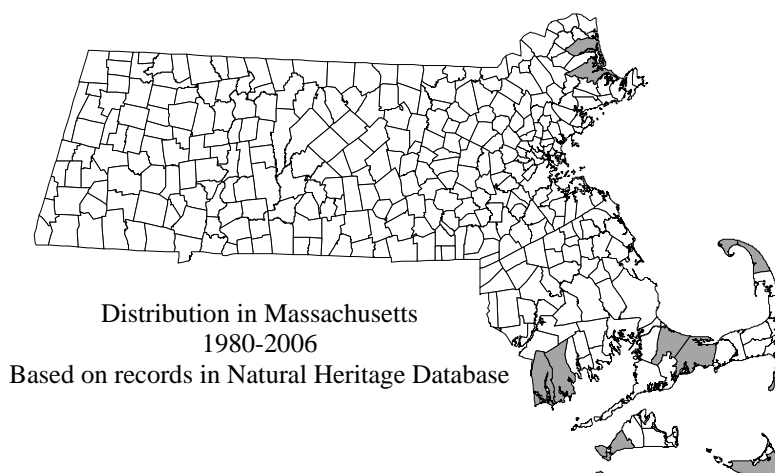
blowouts can occur and the beachfront will erode as sand is transported behind the primary dunes. This occurs naturally as part of the dynamic ecosystem; it is when overly enhanced by human use that it becomes a problem for the ecosystem.

Because of the poor understanding of a barrier beach's ability to withstand alteration, construction/development/sand mining and other forms of manipulation have occurred frequently in these fragile ecosystems – often with disastrous and expensive consequences. Once the dunes are degraded, the land and water areas behind the frontal dune lose their protection and the stability of the ecosystem is threatened.

Many of the barrier beaches in Massachusetts are managed partially or completely by public agencies or private conservation organizations, but even land under public ownership has been abused. Some dune complexes have suffered severe erosional damage as a result of heavy ORV traffic. Other ecologically valuable areas are vulnerable to future development. A measure of protection comes through the Wetlands Protection Act and Executive Order no. 181. The order limits future development on Massachusetts barrier beaches by withholding state insurance and financing for commercial and residential construction. It prohibits all construction activity in the foreshore area to the back dune line.

### **Range and example of the barrier beach system**

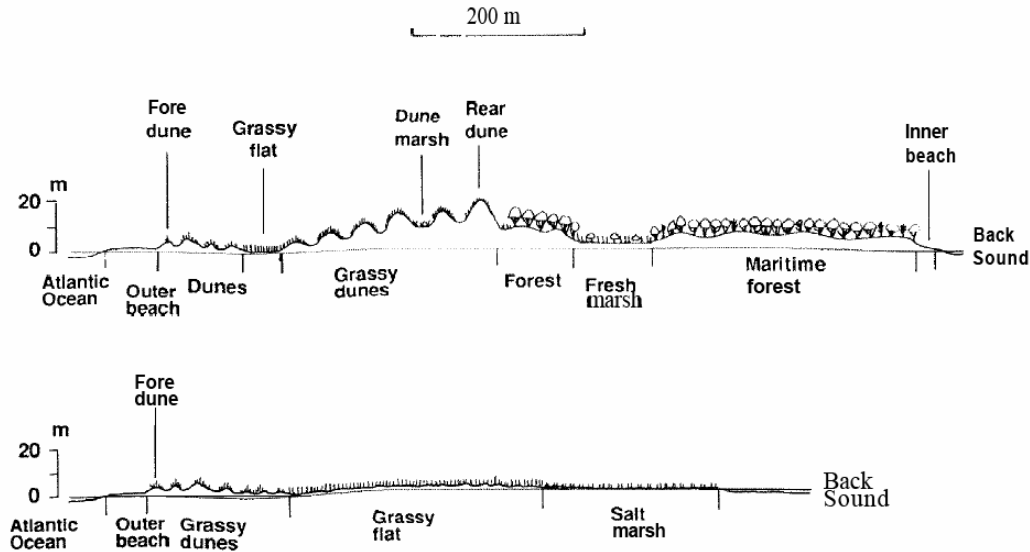
A series of barrier beaches, separated from the mainland by tidal basins or brackish marshes, run much of the length of the Massachusetts coast from Salisbury around Cape Cod and southward to Westport. Plum Island and Monomoy are two fine examples of barrier beach/island systems.



### **Mapping conventions**

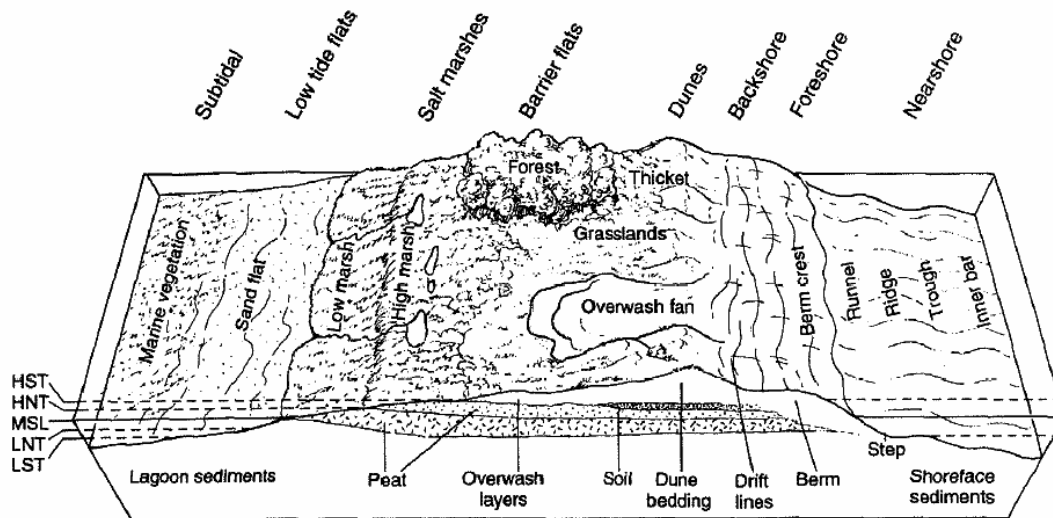
The barrier beach/dune system extends from mean low water (MLW) on the ocean beach, over the dune complex, to the backing flats and marsh.

## NHESP Barrier Beach Fact Sheet



Transect diagrams showing generalized physiography of forested and unforested portion of Shackleford Banks, North Carolina (From Au 1969)

“From Au, S. 1969, in Bellis, 1995. Ecology of Maritime Forests of the Southern Atlantic Coast: A Community Profile. USNBS.”



The basic physiographic and ecological zones of a typical barrier island (the diagram indicates the zonation on typical barrier beaches and does not imply that every barrier resembles the drawing).

“From Bellis, 1995. Ecology of Maritime Forests of the Southern Atlantic Coast: A Community Profile. USNBS.”